1989 Annual Report

ORTECH
INTERNATIONAL

91-05323/

Contents

A Message from the Chairman.....2
A Statement from the President 3
Corporate Perspective.....4
Report on Operations – Highlights.....6
Financial Statements.....9
Board of Governors and Officers.....12
Patents and Publications..... 14
Assistance to Outside Organizations.....15
Staff List.....16

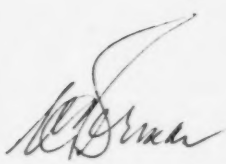
A Message from the Chairman

Throughout the 1980's, ORTECH International provided its myriad clientele with solutions to technical problems, with assistance in developing their ideas and with competent, professional analytical services. As we completed our 61st year, ORTECH's client list had grown to more than 2,500 annually, an increase of 50 percent over the decade. But, perhaps the optimum benchmark of our growth has been the ability to align our capabilities with the changing needs of those customers.

For example, our experiences of the past few years clearly demonstrated that future success would be abetted by focussing our efforts onto three principal areas of service: environmental technologies, materials technologies and transportation systems. The decision to do so required no restructuring other than the assignment of operational and marketing responsibility for each focus area to a vice-president. All Centres within ORTECH continue to operate as before, but with new emphasis on the opportunities in the areas of focus.

In another step to ensure the future growth of ORTECH in the decades ahead, the Board of Governors announced the appointment of a new president, Ross Lawford, Ph.D. A veteran R&D manager, Ross joined ORTECH on January 1, 1990 following 12 years as general manager and technical director of Diversified Research Laboratories Ltd., a division of George Weston Limited.

With Ross Lawford's leadership and with the three areas of focus as a catalyst for our efforts, ORTECH International is well positioned to meet the challenges of the 1990's. I am confident that those seeking professional and technical support from ORTECH during the next decade will find the same state-of-the-art technical excellence and imaginative application of engineering and science that has been the hallmark of our company for more than six decades.



CHAIRMAN
Vern German

A Statement from the President

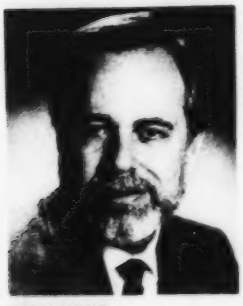
The opportunity to lead an organization with the prestigious history of ORTECH International is indeed exciting. In the few short months between my arrival and this report, I have been continually reminded that this company's greatest asset is its people. Assuring them an atmosphere that is at once challenging and rewarding is one of my top priorities.

Also high on my list is instilling the idea with our many clients, as well as those we would like to have as clients, that the research and development performed for them here should be viewed as an investment. Companies which perceive R&D merely as an expense are not likely to perceive it as important. R&D, like capital equipment, must be judged by its likelihood of generating a good return on the investment. Only then will companies fold R&D into the strategic equation and thus elevate it to its rightful position in the hierarchy of company issues.

Additionally, the mandate of ORTECH International, as I see it, is connected to the idea of technology diffusion. We must be prepared to adapt our approach to the needs of a particular customer. This is largely dependent upon the size of the customer and the degree of technical sophistication. Many companies to whom we could transfer technology, for instance, have no mechanism for receiving it. As a result, part of our mandate must be to adjust our delivery mechanism so that those companies can avail themselves of modern technology and then apply it to achieve a competitive edge.

There is, however, more to our mandate than technology diffusion. Just as important in helping our clients to be more competitive is the technical service and backup we provide. Because we have such a large resident capability in a variety of technologies, I see an important role in being able to help companies in this way. Take quality, for instance. Part of quality is being able to measure exactly how well critical parts of the process are working so that adjustments can be made and the product consistently produced to the customers' expectations. That involves a lot of increasingly sophisticated technical measurement and analysis – areas of long-standing ORTECH expertise.

Between these two kinds of activities, technology diffusion, and technical service and backup, I think we can play an important role in helping companies to be more productive, to increase the quality of their output and, because of these two things, to be more competitive in the global marketplace.



PRESIDENT
Ross Lawford

Corporate Perspective

1989 was a year of transition at ORTECH; a year of re-positioning and focussing to prepare for the opportunities and issues of the '90s.

One of the fundamental strengths and differentiating characteristics of ORTECH is our ability to draw on a diverse base of technological capabilities and form teams of experts to address client needs. While a broad range of capabilities remains important, it is recognized that we must better focus our activities, capabilities and services to develop a visible critical mass of expertise in specific market/technology sectors. In short, we must strive to become clearly recognized as leaders in selected fields.

As a first step in the focussing process, three theme areas have been identified to form the general focus of company activities:

- ENVIRONMENTAL TECHNOLOGIES
- MATERIALS TECHNOLOGIES
- TRANSPORTATION SYSTEMS.

A vice-president was assigned overall responsibility for each focus area and organizational technology units and services have been grouped within the most appropriate area. The Report on Operations which follows this section, has been structured along these lines.

In 1989, renewed priority was placed on the development of more positive relationships with the Province of Ontario and the Federal government; to develop strategic actions to improve these relationships and to better optimize government-related business opportunities for the company.

A milestone of major significance for ORTECH was the signing, in 1989, of a first Memorandum of Understanding (MOU) with the Ministry of Industry, Trade and Technology (MITT). The MOU is intended to more formally define ORTECH's relationship with MITT and to initiate a clearer definition of our role in Provincial technology strategy and our role as the major force in Ontario for the transfer of technology to industry. After months of considerable effort to properly define the MOU, it was signed by representatives of MITT and ORTECH in December. An important facet of the MOU is the establishment of a working-level MITT/ORTECH Liaison Committee mandated to identify and develop programs and activities we would carry out, under contract, in support of the Province of Ontario's technology initiatives.

We raised the priority of improved positioning and relations with the Federal government by establishing a senior corporate business development position to identify and exploit business opportunities for ORTECH. In addition, much greater emphasis is being placed on generally making us more visible as a participant in R&D activities from a government perspective.

ORTECH recognizes the international nature of technology and we further recognize our responsibility to bring to our clients advice and expertise based on an appreciation for the world-wide evolution of our technology base.

In 1989 we continued our efforts to develop formal and informal relationships with foreign research and development organizations similar to ourselves. These international linkages include ties with the Fraunhofer Institutes (West Germany), the Production Engineering Research Association and Electrical Research Association (England), SRI International, Battelle, Southwest Research (USA), Bertin (France), Eniricerche (Italy), and the Kyoto Research Park (Japan). In October, ORTECH joined with about 20 R&D organizations and science parks world-wide in the formation of a consortium for mutual interest in technology awareness and transfer, and collaborative business development.

We participated in the Premier of Ontario's trade mission to Lombardy, Italy, the Flanders Technology Fair in Ghent, Belgium, and a world science park conference in Kyoto, Japan. We also presented proposals jointly with the Ontario Centres of Excellence for participation in the science and technology agreement between Ontario and Baden-Wuerttemberg, West Germany.

Report on Operations – Highlights

ENVIRONMENTAL TECHNOLOGIES

ORTECH's environmental business in 1989 mirrored society's growing concern. Our more than 100 specialists in this area worked at or near capacity throughout the year as they brought their concerted expertise to bear on facets of such paramount issues as the quality of air and water, and the management of waste. Throughout, their major programs were supported by our chemical analytical group which also sold its services directly to more than 300 clients. Of equal importance, however, is the fact that some activities in the other two areas of stated ORTECH focus – transportation systems and materials technologies – were also driven by environmental imperatives.

Contending with waste is a problem which is growing at an alarming rate. Indicative of the attention it commanded in 1989, the Provincially-funded and ORTECH-operated Ontario Waste Exchange received approximately 1,300 enquiries in the final quarter of the year alone – far exceeding the total received in the preceding year. In addition, we managed the Canadian Waste Materials Exchange for the 11th year with more than 3,000 industrial companies availing themselves of the often economically attractive information contained in the bi-monthly bulletin.

Beyond these operations were a number of direct scientific projects which dealt, for example, with viable reuse of such post-production waste as paper mill sludge and the recycling and reuse of chlorofluorocarbons (CFCs) in discarded refrigerators or automobile air conditioners.

The condition of water bodies is another environmental area which commanded our attention and primarily involved us in the form of major contracts with both industrial and government clients. Not only did we compile data regarding airborne toxic compounds which eventually invade major inland water bodies, but we also helped an industrial client with the development of a technology for dealing with oil spills and their clean up.

Within the water, marine life is being contaminated and one project helped to measure the magnitude of that problem in Ontario sport fish while another continued to monitor the effects of a major industrial complex on an Ontario river.

Air quality – both within and outside of buildings – was addressed over a wide range of activities by our environmental specialists. Long-established, air monitoring programs were fine-tuned and continued to provide critical data for the clients while new initiatives documented emissions from major electrical power generating stations and measured on site, airborne contaminants produced during the rehabilitation of a building.

"Energy" has a logical tie-in to environmental activities, and at ORTECH last year, we conducted a number of studies which addressed, for instance, the energy-efficiency of domestic heating units and major electrical appliances as well as the energy claims and labelling associated with high-performance windows.

TRANSPORTATION SYSTEMS

During 1989, significant progress was made to prepare the company to address opportunities in rapidly changing transportation markets. While ORTECH has been active for many years in a number of transportation sectors, it was decided that a more pro-active, targeted approach would be taken as we enter the new decade.

We have created a new operational unit to build upon our presence in the Transportation Sector. Initially, this unit will emphasize technology development and technology transfer in markets related to land vehicles. This approach takes advantage of our excellent reputation in a number of spheres including engine technologies, fuels and emissions, and advanced engineering techniques related to the design and qualification of vehicle structures.

In 1989, the first bus to run successfully with a diesel particulate trap system in North America was equipped with an ORTECH-developed trap system. Bus #1698 started revenue service in downtown New York in March 1989 and 400 new buses equipped with ORTECH trap systems have been ordered.

The unveiling of the first natural gas bus to be delivered to the Toronto Transit Commission (TTC) took place at Ontario Bus Industries (OBI) in the spring. This was a cooperative effort between ORTECH, Cummins Engine Company, OBI, and the Ontario Ministry of Transportation. ORTECH developed the natural gas version of the Cummins L10 diesel engine which was installed in a TTC bus equipped with roof mounted gas tanks. The structural integrity of the bus frame to carry the gas tanks was also investigated at ORTECH. Three natural gas buses are now in service with the TTC.

Also during 1989, significant progress was made in emerging markets related to the development of plastic body systems for automobiles. Contracts valued in excess of $500,000 were secured with a major North American car maker during the last half of the year. To address this market, we installed facilities enabling us to develop and execute sophisticated test and evaluation techniques for both individual components and complete prototype automobiles exposed to simulated hostile environments. ORTECH's unique combination of equipment and skills allowed us to take an innovative approach by treating the automobiles and their environments as complete systems. Significant growth in this activity is anticipated in 1990.

In coming years plastics and composites are expected to make significant inroads as replacements for traditional metals in auto body panels. ORTECH expects to continue making important contributions to the development of these panels by providing a broad range of technical services which span the development cycle from conception to qualification testing.

We are also continuing the development of a natural gas auto conversion kit specifically designed for the new generation of electronically-controlled engines which have outgrown the alternative fuel control technology of the '70s.

The auto conversion kit, which is being developed with funding from Canadian Gas Association, the Ontario Ministry of Energy, and Energy, Mines and Resources Canada, enables drivers to change easily from one type of fuel to another at the flick of a switch. More importantly, it will also reduce environmentally damaging exhaust emissions by at least 25 percent, while increasing the fuel economy of conventional systems by 10 percent or more.

Following a comprehensive series of field tests, including a field demonstration of several hundred vehicles, manufacturing of the conversion kit should begin by early 1991, when it will be available for retrofit to vehicles on the road. Later products will be suitable for retrofit for gasoline-to-propane conversions and for installation as original equipment on both light duty (automotive) and heavy duty (diesel) engines.

MATERIALS TECHNOLOGIES

Building upon long-standing capabilities and growing credentials, our materials experts continued to solve problems, develop ideas and conduct evaluations for industrial and government clients – more than 1,000 of them – in 1989. Activities centred around polymers/plastics, metals and ceramics while our tasks ranged from the formulation of a better automobile gas tank liner material for a small New Brunswick manufacturer to the development of industrial capability in graphite/aluminum composites for the Canadian Space Agency.

Typically, we were involved in the development and selection of appropriate materials through to product prototypes. We also, however, noted an increasing requirement to involve ourselves in environmental issues related to polymers, including the recycling of plastics and rubber, in both a product and process development vein.

On the traditional side, in our textiles testing areas alone, ORTECH specialists provided vital technical support to more than 500 clients. Almost 200 others had compliance testing conducted on their products or materials at our fire and flammability facility.

Our materials experts, however, did not confine themselves to the traditional. Rather, they tailored and even expanded their services to include considerations for product design and engineering – from a "materials" viewpoint – thus increasing the value of their deliverables. As an example, in response to customer needs we developed production methods which included the selection of equipment and the determination of manufacturing processes.

We also helped a leading supplier to the electronic printer industry with an idea for electrochemical – rather than mechanical – processing of stainless steel overlays used in print cartridge manufacturing.

Developmental ceramic activities included the continuance of a program for the manufacture of ceramic powder in zero-gravity environment and the manufacture of abrasive grain using sol-gel technology.

Throughout the year, more than 75 "materials" dedicated employees combined state-of-the-art expertise with comprehensive technical facility to provide clients with the answers they need to become or remain competitive.

Management's Report

The consolidated financial statements of ORTECH Corporation and its subsidiary and all information in the annual report are the responsibility of management.

The financial statements have been prepared by management in accordance with generally accepted accounting principles and include amounts that are based on our best estimates and judgements.

Management has developed and maintains systems of internal accounting controls and procedures in order to provide reasonable assurance as to the reliability of the financial records and the safeguarding of assets. The Corporation's independent auditors, Peat Marwick Thorne, provide an objective, independent review of management's discharge of their responsibilities as they relate to the fairness of reported consolidated operating results and financial position of the Company in accordance with generally accepted accounting principles.

The Audit Committee of the Board reviews the consolidated financial statements with management and the external auditors prior to submission to the Board for approval, as well as the recommendations of the external auditors for improvements in internal controls and the action of management to implement such recommendations.

PRESIDENT
R. Lawford

VICE-PRESIDENT, FINANCE
B.T. Porter

Auditors' Report

To the Board of Governors of ORTECH Corporation

We have examined the consolidated balance sheet of ORTECH Corporation as at December 31, 1989 and the consolidated statements of income and retained earnings, fixed asset contributions and cash flows for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these consolidated financial statements present fairly the financial position of the Company as at December 31, 1989 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

The consolidated financial statements for the preceding year were examined by other chartered accountants.

Peat Marwick Thorne

MISSISSAUGA, ONTARIO
FEBRUARY 9, 1990

Consolidated Balance Sheet, December 31, 1989

(with comparative figures for 1988) ($000's)

	1989	1988
ASSETS		
CURRENT ASSETS		
Cash and short-term deposits	$ –	$ 26
Accounts receivable	7,023	6,724
Prepaid expenses	513	426
	7,536	7,176
PREPAID PENSION (note 1)	639	528
INVESTMENTS (note 2)	2,278	2,140
FIXED ASSETS (note 3)	11,582	11,555
	$22,035	$21,399
LIABILITIES AND CAPITAL		
CURRENT LIABILITIES		
Bank indebtedness	$ 1,826	$ –
Accounts payable and accrued liabilities	2,499	2,698
Amounts received in advance for research and other projects	173	317
	4,498	3,015
CAPITAL (note 4)		
Capital contributions	3,363	3,363
Fixed asset contributions	4,564	4,924
Retained earnings for acquisition of equipment and facilities	9,610	10,097
	17,537	18,384
	$22,035	$21,399

APPROVED BY THE BOARD:

CHAIRMAN
V.C. German

GOVERNOR
E. Parliament

Consolidated Statement of Income and Retained Earnings
For the year ended December 31, 1989
(with comparative figures for 1988) ($000's)

	1989	1988
Revenue		
Professional services	$25,096	$23,105
Contributions from government (note 5)	3,700	3,833
Investment income	265	321
Royalty and other income	569	506
	29,630	27,765
Expense		
Salaries and benefits	15,763	14,531
Other costs of research	10,103	8,001
Depreciation expense less transfer from fixed asset contributions of $1,036 (1988 – $997)	1,431	1,498
General	2,820	3,517
	30,117	27,547
INCOME (LOSS) FOR THE YEAR	(487)	218
Retained earnings, beginning of year	10,097	9,879
RETAINED EARNINGS END OF YEAR, FOR ACQUISITION OF EQUIPMENT AND FACILITIES	$ 9,610	$10,097

Consolidated Statement of Fixed Asset Contributions
For the year ended December 31, 1989
(with comparative figures for 1988) ($000's)

	1989	1988
Fixed asset contributions, beginning of year	$4,924	$5,231
Fixed asset contributions received from government (note 5)	676	690
	5,600	5,921
Transfer to income	1,036	997
FIXED ASSET CONTRIBUTIONS, END OF YEAR	$4,564	$4,924

Consolidated Statement of Cash Flows
For the year ended December 31, 1989
(with comparative figures for 1988) ($000's)

	1989	1988
CASH PROVIDED BY (USED FOR):		
OPERATING ACTIVITIES		
Income (loss) for the year	$ (487)	$ 218
Items not involving cash		
Depreciation	1,431	1,498
Loss on sale of fixed assets	(5)	5
Gain on sale of investments	(23)	(67)
Prepaid pension	(111)	(103)
	805	1,551
Net changes in working capital items		
Accounts receivable	(299)	(1,849)
Prepaid expenses	(87)	35
Accounts payable and accrued liabilities	(199)	728
Amounts received in advance for research and other projects	(144)	83
	76	548
FINANCING ACTIVITIES		
Fixed asset contributions (note 5)	676	690
INVESTING ACTIVITIES		
Proceeds from investments	(115)	440
Proceeds on sales of fixed assets	23	24
Additions to facilities	(131)	(207)
Acquisition of apparatus and instruments	(2,212)	(1,255)
Acquisition of other equipment	(169)	(617)
	(2,604)	(1,615)
DECREASE IN CASH FOR THE YEAR	(1,852)	(577)
Cash, beginning of year	26	403
CASH (BANK INDEBTEDNESS), END OF YEAR	$(1,826)	$ 26

Notes to Consolidated Financial Statements ($000's)
Year ended December 31, 1989

GENERAL

The Corporation operates under the Research Foundation Act, 1944. In 1988, the Corporation's name was changed from Ontario Research Foundation to ORTECH Corporation, operating under the name ORTECH International.

SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

PRINCIPLES OF CONSOLIDATION

These consolidated financial statements include the accounts of ORTECH Corporation and its wholly owned subsidiary, Ordco Technology Limited.

FIXED ASSETS AND DEPRECIATION

Fixed assets are stated at cost less accumulated depreciation. Depreciation is provided on a straight-line basis at the following annual rates:

Buildings	3-1/3% and 5%
Apparatus and instruments	20% and 33-1/3%
Other equipment	6-2/3% to 33-1/3%

INCOME RECOGNITION

Professional services –

Professional services revenue is recognized on the basis of the percentage of completion of the work at estimated fees or at per diem billing rates depending upon the contractual agreements. Estimated losses on contracts are recognized when they become known.

Gain on sale of investments –

Net gains realized on the sale of investments are included in investment income.

PENSION PLAN

The costs of pension benefits earned by employees are determined on an actuarial basis using the projected benefit method. Adjustments to pension costs are amortized to income on a straight-line basis over the expected average remaining service lives of the active employees. Biannual actuarial valuations reflect management's best estimates for investment yields, salary escalation and other factors.

1. PENSION ACCOUNTING

ORTECH Corporation had maintained a contributory defined benefit final average pension plan which covers virtually all fulltime employees. Effective January 1, 1989 the plan was changed to a non-contributory pension plan with an additional savings element for benefits accruing after January 1, 1989. The benefits earned for service prior to January 1, 1989 were retained but the definition of the average earnings period was changed. The present value of accrued pension obligations, the pension plan assets at market related values available to meet these obligations and prepaid pension expense as at December 31, 1989 and 1988 are shown below together with pension income for the years then ended:

	1989	1988
Pension fund assets	$13,854	$12,224
Pension obligations	9,370	9,070
Prepaid pension expense	639	528
Pension income	(111)	(103)

2. INVESTMENTS

	1989	1988
Short-term investments, at cost	$ 538	$ –
Bonds and debentures, at amortized cost	1,147	1,453
Common and preferred stocks, at cost	593	687
	$2,278	$2,140
Quoted market value	$2,629	$2,316

3. FIXED ASSETS

	1989			1988
	Cost	Accumulated depreciation	Net book value	Net book value
Land	$ 597	$ –	$ 597	$ 597
Buildings	13,303	7,529	5,774	6,195
Apparatus and instruments	19,954	15,866	4,088	3,484
Other equipment	4,120	2,997	1,123	1,279
	$37,974	$26,392	$11,582	$11,555

4. CAPITAL

CAPITAL CONSISTS OF THE FOLLOWING:

A. Capital Contributions

Capital contributions comprise the original capital sums donated by the Province of Ontario and industry, the income from which is being used to assist in meeting annual expenses in accordance with the terms of the contributions.

B. Fixed Asset Contributions

Fixed asset contributions received from government provide external resources for acquisition of fixed assets. These contributions are included in capital and are transferred to income over the estimated useful lives of the related assets.

C. Retained Earnings for Acquisition of Equipment and Facilities

Retained earnings provide the internal resources for acquisition of fixed assets.

5. CONTRIBUTIONS FROM GOVERNMENT

In 1989 and 1988, ORTECH Corporation received from the Province of Ontario $3,700 for projects and operations and $676 for fixed asset additions. In 1988, a one-year contribution agreement with the Federal Ministry of Regional and Industrial Expansion was obtained to provide contributions of $133 for operations and $14 for fixed asset additions.

6. CONTINGENT LIABILITIES

Two claims regarding employment terminations have been made against ORTECH Corporation. ORTECH Corporation is disputing these claims and has instructed its solicitors to defend its position. It is too early in the proceedings to determine the likelihood of the outcome or the extent of the losses, if any, and the legal fees associated with these claims cannot be estimated at this time.

Board of Governors, as at March 1, 1990.

CHAIRMAN
V.C. GERMAN
Corporate Director and former President
Pilkington Glass Ltd.

VICE-CHAIRMAN
D.A. CHISHOLM
Corporate Director and former Executive Vice-President, Technology and Innovation
Northern Telecom Canada Ltd.

VICE-CHAIRMAN
P.A. LAPP
President
Philip A. Lapp Ltd.

MEMBERS

B. CALDWELL
President
CleanWear Products

R.A. FERCHAT
Corporate Director and former President
Northern Telecom Canada Ltd.

D.M. GREEN
Chairman and Chief Executive Officer
Tridon Limited

R. HALSALL
President
Robert Halsall & Associates Ltd.

R.F. HAWKINS
President
Union Drawn Steel Company Ltd.

H. HOFMANN
President
Devtek Corporation

H. MACDIARMID
President
Lumonics Inc.

D.C. MACGREGOR
Medical Director and Vice President, Clinical Research
Cordis Corporation

W.J. MCCLEAN
Vice President, Manufacturing and Development
IBM Canada Ltd.

G.G. MCKENZIE
Chief Operating Officer
McCarthy Tétrault

E. PARLIAMENT
Corporate Secretary and Director of Administration
Woodbridge Foam Corp.

C. SALOMON
Senior Vice President, Marketing
Purolator Courier Ltd.

W.J. SCHABEREITER
Corporate Vice President
COSMA International

D.J. WATCHORN
Partner
Davies, Ward & Beck

Officers

V.C. GERMAN	CHAIRMAN
D.A. CHISHOLM	VICE-CHAIRMAN
P.A. LAPP	VICE-CHAIRMAN
G.R. LAWFORD	PRESIDENT
W.D. HEASLIP	VICE-PRESIDENT Marketing, & Materials Technology
F.J. HOPTON	VICE-PRESIDENT Environmental Technologies
R.W. NEVILLE	VICE-PRESIDENT Transportation Systems
B.T. PORTER	VICE-PRESIDENT Finance, Secretary-Treasurer

Committees

EXECUTIVE COMMITTEE

V.C. GERMAN*	CHAIRMAN
D.A. CHISHOLM	VICE-CHAIRMAN
P.A. LAPP	VICE-CHAIRMAN
MRS. E. PARLIAMENT	MEMBER

FINANCE/AUDIT COMMITTEE

MRS. E. PARLIAMENT	CHAIRMAN
R.A. FERCHAT	MEMBER
V.C. GERMAN*	MEMBER
R.F. HAWKINS	MEMBER
D.J. WATCHORN	MEMBER

NOMINATIONS/HUMAN RESOURCE COMMITTEE

D.A. CHISHOLM	MEMBER
V.C. GERMAN*	MEMBER
R. HALSALL	MEMBER
H. HOFMANN	MEMBER
R.M. DILLON	MEMBER

STRATEGY COMMITTEE

P.A. LAPP	CHAIRMAN
D.A. CHISHOLM	MEMBER
V.C. GERMAN*	MEMBER
H. MACDIARMID	MEMBER
W.J. MCCLEAN	MEMBER
W.J. SCHABEREITER	MEMBER

GOVERNANCE COMMITTEE

H. MACDIARMID	CHAIRMAN
MRS. B. CALDWELL	MEMBER
V.C. GERMAN*	MEMBER
G.G. MCKENZIE	MEMBER

*ex-officio

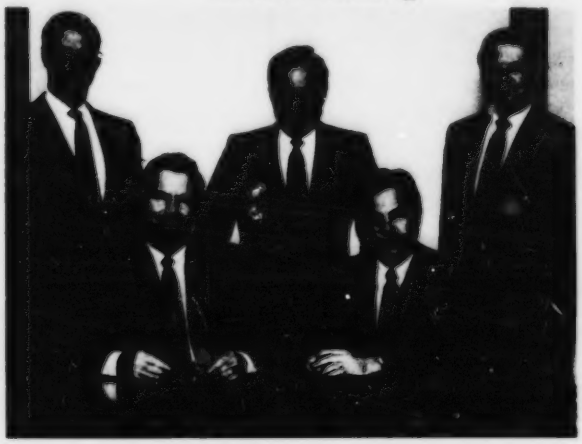
ORTECH EXECUTIVE COUNCIL

(standing left to right)

RON NEVILLE	*Vice-President, Transportation Systems*
ROSS LAWFORD	*President*
FRED HOPTON	*Vice-President, Environmental Technologies*

(sitting left to right)

BRUCE PORTER	*Vice-President Finance, Secretary-Treasurer*
DAVID HEASLIP	*Vice-President, Marketing, and Materials Technology*



1989 Patents and Publications

PATENTS

Patents were granted to ORTECH in 1989 for the following:

- Biological contact gas scrubber for waste gas. Brett Kahler and Matthew McKim.
- Four patents relative to diesel engine particulate traps. Henry Vergeer, Wayne Robinson, William Jones, Kong Ha and Alex Lawson.
- Method of manufacturing magnetic particles for a Magnetic Particle Display. Jacob Leidner.

PUBLICATIONS

1313. **KUNTZE, R.A., THAYER, A.G. AND MAYER, P.J.**
Utilization of Waste-Derived Gypsum for Mine Backfill. Proceedings of the International Symposium on Tailings and Effluent Management, Halifax, Nova Scotia, August 20-24, 1989. pp. 239-246

1314. **KYLE, B.R.M.**
Using Taguchi Methodology for Optimizing Products and Processes. ANTEC 89. Society of Plastics Engineers 47th Annual Technical Conference & Exhibition, May 1-4, 1989. pp. 1704-1706.

1315. **HA, K. AND LAWSON, A.**
Development of a Diesel Particulate Trap System for a 6-B-92TA Engine. Society of Automotive Engineers Proceedings No. SP-775

1316. **KYLE, BRETT R.M.**
Development of a Porcelain Repair Compound. Canadian Supplier's Institute 1st Taguchi Symposium Proceedings. Toronto, Ontario, October 28, 1989.

1317. **KYLE, BRETT R.M.**
Investigation of a Plastics Reprocessing Process. American Supplier's Institute. 7th Symposium on Taguchi Methods. Phoenix, Arizona, October 18-20, 1989. pp. 388-399.

1318. **WELCH, ALAN**
6V-92TA Diesel Pilot Ignited NG Engine. Fifth Windsor Workshop on Alternative Fuels, Windsor, Ontario, June 13, 1989. Proceedings, pp. 196-214.

1319. **CARTER, STEPHEN A., WILLIAMSON, BRYAN C. AND KOZOLE, KARL H.**
Gaseous Fuel Injection Systems (GFI) for Light and Heavy Duty Vehicles, Fifth Windsor Workshop on Alternative Fuels, Windsor, Ontario, June 13, 1989. Proceedings, pp. 41-57.

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Assistance to Outside Organizations

ORTECH's activities are not limited to performing technical tasks for our clients. More than 50 members of this organization, including officers, directors, managers, scientists and engineers, spent countless hours, many of them outside the normal working day, contributing to the overall advancement of technology through service on various boards and committees of the following 44 organizations during 1989:

Air and Waste Management Association
American Institute of Mining and Metallurgy
American Society for Testing and Materials
Association of Provincial Research Organizations
Building Thermal Envelope Coordinating Council
Canadian Advanced Industrial Materials Forum (CAIMF)
Canadian Construction Research Board
Canadian General Standards Board
Canadian Home Builders Association (CHBA)
Canadian Institute of Mining and Metallurgy
Canadian Journal of Fisheries and Aquatic Sciences
Canadian Research Management Association
Canadian Standards Association
Canadian Window and Door Manufacturers (CWDMA)
Conservation Council of Ontario
Durham College Food & Drug Technology Advisory Committee
Durham Region Manufacturers Association
Environment Canada
Executive Women International
Federation of Societies for Coatings Technology
Financial Executives Institute
Health and Welfare Canada
Institute of Textile Science (ITS)
Insulated Glass Manufacturers Association (IGMAC)
International Organization for Standardization (ISO)
Management of Technology and Innovation Institute
National BIOMINET Committee
National Research Council of Canada
New Mexico Institute of Mining and Metallurgy
Ontario Federation of Agriculture
Ontario Ministry of the Environment, Hazardous Waste Advisory Committee
Pollution Probe Foundation
Queen's University, Advisory Council on Engineering
Sheridan College
Sheridan Park Association
Small Motor Manufacturers' Association
Society of Mining Engineering
St. Clair River Remedial Action Plan – Binational Public Advisory Council
Standards Council of Canada
Technical Association of the Pulp & Paper Industry (TAPPI)
The Fifth International Conference on Indoor Air Quality and Climate
The Metallurgical Society
Waste Reduction Council in Flamborough
Women and Environments Educational and Development Foundation

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